

Explaining variations in the frequency of night visits in general practice

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Background and Objective. The study identifies factors which explain variations in the frequency of night visits made by general practitioners, and is based on a cross-section regression analysis of practices in Lincolnshire in 1993.

Method. The independent variables comprise 22 general practice characteristics, related to health and socio-demographic structure of practice lists, practice management and organization, location and social deprivation.

Results and Conclusions. A final model containing 6 of the 22 variables originally entered succeeds in explaining 72 per cent of the variation in the frequency of night visits per GP per quarter-year. These variables are average list size per GP, frequency of home visits, maternity claims, list inflation owing to the influx of temporary residents, the number of proximate practices and unemployment.

Keywords. Frequency, general practice, night visits, variables, variations.

Introduction

For the overwhelming majority of general practitioners (GPs), the provision of out-of-hours medical care has long been required by, and reimbursed under, the terms of service.¹ The 1990 GP contract made the financial arrangements relating to night visiting considerably more generous than those pertaining previously: the fee payable to GPs rose to more than double its previous level and the hours for which the fee could be claimed were extended from eight to 10 during the night.² These reforms notwithstanding, the provision of out-of-hours medical care remains a source of considerable concern to GPs. The General Medical Services Committee have claimed that the number of night visits has increased five-fold in the past 25 years, has doubled in the past three years, and that this growth is exerting a substantial impact on overall GP workload.³

In spite of previous research,⁴ the causes of growth in the number of night visits, and, indeed, the causes of night visits in general, remain unclear.^{5,6} Earlier studies have revealed the rate of night visiting per 1000 patients to be extremely variable on a practice-by-practice basis.^{7–9} Amongst the clinical and socio-

demographic factors which have been identified as contributing to higher rather than lower rates of night visiting are higher standardized mortality ratios,¹⁰ greater socio-economic deprivation,^{7,11,12} and a higher prevalence of very young and/or elderly patients on the practice list.^{10,13,14}

Evidence also suggests that the night visiting rate might have as much to do with social or practice management factors as with patient health needs or demography. For example, 'perverse' deprivation effects have been identified, whereby higher visiting rates prevail in less deprived localities, owing to patient expectations.¹⁵ Moreover, the frequency of use of deputizing services appears to have changed with the 1990 contract. Prior to 1990, a higher rate of night visiting was associated with the greater use of deputizing services^{7,8} although, post-1990, such use began to decrease relative to visits made by GPs themselves. It is not unreasonable to suppose that this trend was related to the revised financial structures pertaining to night visiting.^{2,16} Finally, studies have revealed that night visiting rates can differ widely between GPs even when their practices are serving either the same or essentially similar catchment populations.^{9,17}

The present study attempts to contribute to the debate over the causality of the frequency of night visiting, by presenting the results of a cross-section regression analysis of practices within a single English health authority, Lincolnshire. Unlike the majority of earlier

studies, it employs night visits per whole-time-equivalent GP as the dependent variable, on the grounds that this formulation, rather than the visiting rate per 1000 patients, is more informative in gauging the impact on GP workload.

Method

Data on the frequency of night visits per GP and a range of general practice characteristics were obtained for practices in Lincolnshire for the calendar year 1993. At that time, Lincolnshire possessed 108 practices, although complete data were available for 99. Multiple regression analysis was performed on the data, using night visits per GP per quarter-year (averaged over the whole year) as the dependent variable. The mean frequency of night visits per GP per quarter for the sample of 99 was 65.71 (SD = 27.88), with an extreme range of 11–181. The regression model was estimated in both full and final forms, the former entailing forced entry of all variables. The final form was estimated by stepwise regression, entailing the addition or removal of variables from the relevant list in order to obtain significant regression coefficients and the best possible degree of goodness-of-fit. Table 1 lists 18 of the 22 variables entered into the models, together with their descriptive

statistics. The remaining four were dummy variables and the presentation of such descriptive statistics is therefore inappropriate.

The choice of explanatory variables to be entered into the regression equation was naturally constrained by data availability, although it was influenced also both by the findings of earlier studies and prior hypothesis. Broadly speaking, four types of variable were included. First, variables 1–5 in Table 1 reflect aspects of the health and demographic structure of the practice lists. Permanent sickness data, derived from the 1991 Census results, serve as a proxy for practice morbidity. Maternity claims per GP per quarter serve as a proxy for the presence of pregnant women with very young children on the list, such persons having been identified as heavy users of out-of-hours services in previous research. Second, variables 6–12 relate to aspects of practice organization and patient management. Earlier research suggested the use of nursing inputs and the age of partners as potential determinants of the night visit rate.¹⁰ Because age of partners had already been suggested as a candidate for explaining night visit rates, we felt it appropriate to explore whether GP gender was also a relevant factor. Previous research has already suggested that practices with a female principal are less likely to use a deputizing service,¹⁸ and it could be hypothesized that female GPs might be less willing to

TABLE 1 *Descriptive statistics for continuous explanatory variables*

No.	Variable	Mean	10	Percentiles			90
				25	50	75	
1	Percentage of patients who are female	51.17	49.21	50.21	51.08	51.97	53.13
2	Percentage of patients reported as permanently sick	3.73	2.67	3.10	3.46	4.21	4.77
3	Maternity claims per GP per quarter	1.64	0.80	1.09	1.39	1.96	2.75
4	Percentage of patients aged ≥ 65 years	19.22	14.17	16.54	18.81	21.14	22.93
5	Percentage of patients resident in nursing homes	1.28	0.00	0.32	1.00	1.50	3.13
6	Percentage of female GPs	20.10	0.00	0.00	16.67	33.33	50.00
7	Nursing hours per GP per week	15.68	6.25	10.00	13.58	20.00	27.50
8	Number of branch surgeries	0.77	0.00	0.00	0.00	1.00	2.00
9	Average age of partners (years)	44.12	38.00	40.00	42.00	47.00	55.00
10	Referrals to hospital per GP per quarter	38.94	11.69	15.76	26.42	48.69	81.75
11	Patients per GP	1922	1329	1518	1906	2152	2679
12	Home visits per GP per quarter	211.60	49.94	115.63	172.63	292.13	437.50
13	List inflation owing to temporary residents (% of normal list)	6.90	2.20	2.90	3.50	4.70	6.70
14	Rural practice payment per GP (£)	481.62	1.00	102.00	455.20	747.00	1038.20
15	Miles from surgery to nearest hospital	7.03	0.53	1.78	6.92	11.01	13.67
16	Number of other practices within one mile radius	1.48	0.00	0.00	1.00	2.00	5.00
17	Jarman score	-2.09	-13.71	-10.79	-5.23	4.26	15.60
18	Unemployment rate (%)	8.17	5.22	5.75	6.63	9.55	13.68

undertake out-of-hour calls for fear of violence.¹⁹ It seemed plausible that the availability of branch surgeries could influence patient access to surgeries during normal hours, and thus the demand for out-of-hours service. We also included average list size per GP, on the simple, intuitive basis that responsibility for more patients could entail the requirement for more night visits, *ceteris paribus*. Moreover, a positive association in this respect had been identified in other studies.^{10,20} Referrals to hospital per GP per quarter was included on the basis of the view that GPs undertaking many night visits might be better informed about their patients and thus more selective in referring them to hospital.²¹ We included the average number of home visits per GP per quarter as an independent variable, on the grounds that it would capture general GP attitudes towards the provision of care beyond the confines of the surgery.

Third, variables 13–16 are concerned with spatial location. Lincolnshire is a predominantly rural county with a number of isolated urban centres, and it seemed plausible to speculate that geographical distances between the GP, the patient and the nearest available hospital could influence both the perceived need and requirement for a night visit. It has already been shown, for example, that the distance from hospital explains, in part, variations in attendance rates at accident and emergency departments,²² whilst the patient's distance from surgery lowers the frequency of normal consultations.²³ Rural practice payments are calculated on the basis of surgery–patient distances¹ and are thus a proxy for the spatial distribution of patients. The number of practices within a one-mile radius is a measure of practice density and is, broadly speaking, a proxy for urbanization. We also included a measure of list inflation arising from the influx of temporary residents. Lincolnshire is the site of a number of popular tourist resorts, for example, those along the coast and Lincoln itself, and we hypothesized that a GP's first meeting with such temporary residents might typically be an out-of-hours call to deal with a perceived emergency. Note that the distribution of this variable exhibits extreme skew, with the value of the mean being above the value for the ninetieth percentile. Five Lincolnshire practices possessed list inflation rates exceeding 30%, of which one approached 100%. Finally, variables 17 and 18 represent two measures of socio-economic deprivation, each of which had been cited in earlier research as contributing to variations in the night visiting rate.

In addition to these continuous variables, we felt it appropriate to include four binary dummy variables (not shown in Table 1), each related to different possibilities for practice organization. These were whether or not the practice was single handed, fundholding, a training practice and if it reported having an agreed protocol for facilitating emergency consultations during normal surgery hours. We have already established that

being single-handed or fundholding contributes to an explanation of prescribing behaviour in Lincolnshire²⁴ and it would seem appropriate to explore whether differences also exist with respect to the provision of out-of-hours services. Conceivably, training practices might offer their patients more night visits than non-trainers, as part of the programme of education. The last variable was included specifically on the prior hypothesis that practices with arrangements to see emergency cases immediately during normal hours might be able to economize on night visits. For each of these variables, the numbers of such practices in our sample was 20, 18, 25 and 55, respectively.

Results

Table 2 presents the regression results—regression coefficients (β) and their significance expressed as T-ratios—for both the full and final models. Estimates of the variance inflation factors (VIF) are also presented. The VIF is a measure of multicollinearity, i.e. strong correlation, between the independent variables. The presence of multicollinearity implies large standard errors and imprecise estimates of the regression coefficients and, by convention, values of the VIF beyond 10 are deemed to be indicative of serious multicollinearity problems.²⁵ In the full model, the VIFs suggest serious multicollinearity in the cases of variables 2, 17 and 18, with the result that the β -coefficients and T-ratios for these variables are unreliable.

As may be seen in Table 2, stepwise regression produced a final model in which only six of the original 22 variables were present. This model explains 72% of the variation in the frequency of night visits and all variables now pass the multicollinearity test. As a further check, the final model was re-estimated using each of the two other colinear variables—permanent sickness and Jarman score—in place of unemployment. In both cases, insignificant T-ratios for these variables resulted, confirming the equation with unemployment as the superior alternative.

Discussion

The dependent variable in this study has been night visits per GP, and this distinguishes it from many others which have employed visits per patient. This having been said, the final model does appear to lend support to pre-existing hypotheses about the causality of night visits. First, socio-economic deprivation measured as the practice's unemployment rate appears as a significant determinant of visiting frequency, a finding in line with the bulk of earlier research. Moreover, our formulation supports the view expressed by others that the predictive power of unemployment with respect to night visits is superior to that of the Jarman index.¹² Second, again

TABLE 2 *Regression results*

No.	Variable	β	Full model T-ratio	VIF	β	Final model T-ratio	VIF
1	Percentage of patients who are female	-0.385	-0.306	2.025			
2	Percentage of patients reported as permanently sick	1.622	0.354	11.376			
3	Maternity claims per GP per quarter	11.343	4.837	2.282	10.062	5.224	1.634
4	Percentage of patients aged ≥ 65 years	0.666	1.248	2.622			
5	Percentage of patients resident in nursing homes	-0.592	-0.452	1.299			
6	Percentage of female GPs	-0.090	-0.969	2.203			
7	Nursing hours per GP per week	0.049	0.218	2.044			
8	Number of branch surgeries	2.326	1.330	1.670			
9	Average age of partners (years)	-0.366	-1.193	1.499			
10	Referrals to hospital per GP per quarter	0.074	0.771	4.371			
11	Patients per GP	0.022	3.585	4.399	0.024	6.394	1.792
12	Home visits per GP per quarter	0.030	2.150	1.797	0.035	2.949	1.362
13	List inflation owing to temporary residents (% of normal list)	0.324	1.555	3.604	0.347	2.353	1.920
14	Rural practice payment per GP (£)	-0.002	-0.320	2.829			
15	Miles from surgery to nearest hospital	-0.298	-0.701	2.156			
16	Number of other practices within one mile radius	-3.246	-2.261	3.266	-2.338	-2.270	1.784
17	Jarman score	0.628	1.475	9.171			
18	Unemployment rate (%)	-0.183	-0.087	20.782	1.819	2.606	2.433
19	Single-handed? (1 = Yes, 0 = No)	-2.185	-0.345	2.774			
20	Fundholding? (1 = Yes, 0 = No)	4.050	0.768	1.781			
21	Training practice? (1 = Yes, 0 = No)	3.467	0.879	1.263			
22	Protocol for emergency consultations? (1 = Yes, 0 = No)	1.668	0.486	1.250			
	Constant	19.288	0.281		-18.344	-2.433	
	<i>Adjusted R-squared</i>	<i>0.703</i>			<i>0.721</i>		

as inferred by others,¹⁰ we find that average list size is a determinant of the night visiting frequency. The simple fact of being responsible for more patients, on average, raises the frequency of night visiting. Third, the existing evidence that night visit rates are strongly influenced by the prevalence of young children and pregnancy within the practice⁴ receives support from the inclusion of the maternity claims variable. Fourth, the significance of the home visits variable lends weight to the argument that the attitude of any given GP towards the benefits, both medical and non-medical, of providing consultations of any kind outside the surgery is a particularly relevant factor in explaining night visiting frequency.¹⁷ Home visits might be functioning as both a supply and a demand variable, indicating cases where patients have higher expectations which their GPs are more willing to meet.

The two remaining variables of the final model are less well documented in earlier research, possibly because the preponderance of this has been conducted in urban localities and areas more geographically homogeneous than Lincolnshire. The significance of the list inflation variable lends support to our hypothesis that temporary residents are particularly demanding of out-of-hours services. The finding that a higher practice density is associated with fewer night visits is more difficult to explain, however. Accepting that density is a proxy for urbanization, it is possible that rural patients, in comparison to their urban counterparts, have different expectations of their GPs and that GPs, in turn, attach a higher priority to the need for night visiting.¹³ Alternatively, one might posit that urbanization is equivalent to easier access to hospital accident and emergency departments and the lower rate of night visiting in

urban areas therefore reflects patients' preference for hospital care in emergency cases.

Attention should also be paid to the variables which do not emerge as significant in the regression equation. For example, the elderly in Lincolnshire do not appear to be disproportionate users of night visits, contrary to the findings of other studies. By way of explanation, it is possible that, in these studies, the preponderance of elderly patients was actually colinear with other variables which our analysis has managed to identify. None of the practice organization variables, with the exception of average list size, enters the final model, despite the intuitively plausible hypotheses for their inclusion. Interestingly enough, it would appear that fundholding practices, who have managed to effect economies in prescribing,²⁴ have made no equivalent inroads to the management of night visits. The insignificance of the organizational variables suggests that the factors which determine the frequency of night visiting may lie largely outside the GP's sphere of influence. The clear exception in this respect is the size of the partnership. Taking on responsibility for fewer patients lowers the average out-of-hours workload per partner, although it is obvious that increasing partnership size carried with it far more patient management and financial implications than those related merely to night visits.

Finally, it should be noted that the circumstances surrounding night visiting in Lincolnshire are somewhat unusual for two reasons. First, Lincolnshire possesses no deputizing services, i.e. all night visits are made by the responsible GPs. This fact effectively eliminates a potential source of bias in the analysis, namely, the extent to which practices in the area make differential use of deputizing services. Second, Lincolnshire possesses the second-highest night visiting rate per patient per year of the 90 Family Health Service Authorities.²⁶ It is, of course, possible that the two facts are related; on average, night visiting provides Lincolnshire GPs with annual fees of around £12 000 per capita. Under the government's recent reform proposal, which changes the fee from £45 per visit to £20 per visit plus £2000 per annum,²⁷ annual income in Lincolnshire would be reduced to a little over £7000 per GP.

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